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(71)Applicant : YAZAKI CORP

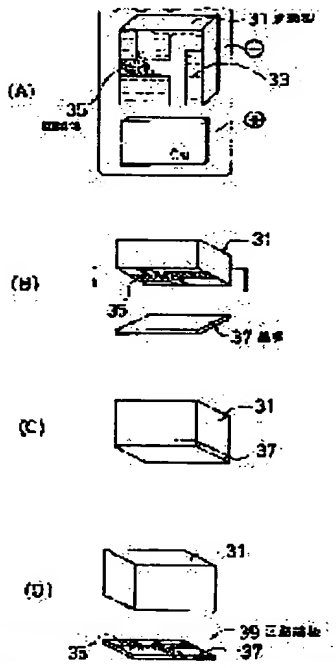
(72)Inventor : AKIBA YOSHINOBU
KATSUMATA MAKOTO
USHIJIMA HITOSHI
YAMANASHI HIDENORI

(54) MANUFACTURE OF CIRCUIT BOARD

(57)Abstract:

PURPOSE: To obtain a circuit board method by which a circuit body having a large cross-sectional area can be formed with high positional accuracy at a low cost in a short working time.

CONSTITUTION: After a circuit body 35 composed of a plated metal layer is formed on the molding surface of a molding tool 31 by electroplating, the tool 31 is pressed against a substrate 37 composed of a thermoplastic resin. Then the circuit body 35 is transferred to the substrate 37 by press-contacting the circuit body 35 against the substrate 37 while the tool 31 is maintained at a high temperature and, after cooling the substrate 37, separating the tool 31 from the substrate 37.



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CLAIMS

[Claim(s)]
[Claim 1] The manufacture method of the circuit board which forms in a shaping side of a die a circuit object which consists of a metal deposit by electrolytic plating, pushes this die against a substrate which consists of thermoplastic resin, carries out heating maintenance of the die, carries out heating sticking by pressure of said circuit object to this substrate, and is characterized by to imprint said circuit object to a substrate side by making said die desert a substrate after substrate cooling.
[Claim 2] A circuit object which consists of a metal deposit by electrolytic plating is formed in a shaping side of a convex die. Carry a substrate which consists of thermoplastic resin on a concave die, and this substrate is made into a heating condition. Push in this substrate into a hole of a concave die with said convex die, carry out heating maintenance of a convex die and the concave die, and heating sticking by pressure of the circuit object is carried out to a substrate. A manufacture method of the circuit board characterized by imprinting a three-dimensions circuit object to an inside of a resin shaping case by making said convex die desert a concave die after substrate cooling.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacture method of the circuit board by heating sticking by pressure.
[0002]
[Description of the Prior Art] Conventionally, as the manufacture method of the circuit board, a photopolymer is applied all over the substrate with which the metal thin film was covered, dissolution removal (etching) of the metal thin film portion which covered the corrosion resistance resin film with photograph technology in the plugging-chart configuration, and was exposed to it with it is carried out with etching fluid, and, generally what obtains the desired circuit board is known.
[0003] As a method by electroless deposition, as shown in drawing 3 , adhesives 3 are applied to the surface of an insulating substrate 1. Moreover, (A), It is immersed in the activation liquid of a palladium chloride, and the metal palladium nucleus 5 of a particle is made to adhere all over a substrate 1. (B), Dissolution removal of the metal palladium nucleus 5 exposed with the etching fluid which prints a plugging-chart form by the resist 7 which consists of resin of corrosion resistance, and dissolves (C) and metal palladium is carried out. (D), After carrying out dissolution removal of the resist 7, what a metal 9 is deposited by electroless deposition and obtains the circuit board of (E) and a request on the metal palladium nucleus 5 which remained in the plugging-chart configuration is indicated by JP,50-113766,A.
[0004] On the other hand, in recent years, in order to attain miniaturization of an electric product, and lightweight-ization, a circuit pattern is formed in the inside surface of a case, and what used the case itself as the circuit board is proposed. As a method of manufacturing such the case combination circuit board, as shown in drawing 4 The imprint sheet 13 which has the circuit 11 which printed and formed conductive ink is preformed. This preforming object is arranged in metal mold 15a of injection molding, and 15b. (A), Injection molding of synthetic resin is performed, the circuit object 11 of three dimensions is formed in the surface at the same time it obtains mold goods 17, and (B) and the thing which obtains the desired circuit board are indicated by JP,63-117493,A by performing metal plating 19 on this circuit object 11.
[0005] Moreover, as other methods of manufacturing the case combination circuit board, as shown in drawing 5 The circuit object 23 is formed in the surface of a core 21, and (A) and this core 21 are set to a die 25. (B), The resin for shaping is fed from sprue 27, and it is filled up in a cavity 29, and after cooling hardening of the shaping resin with which it filled up is carried out, what obtains the desired circuit board is indicated by JP,2-28992,A by opening a die 25 and taking out mold goods.
[0006]
[Problem(s) to be Solved by the Invention] However, by the method by the conventional etching mentioned above, in order to carry out dissolution removal of the metal membrane of a garbage with etching fluid, loss of a material was large, while there was a defect which becomes uneconomical, production time was long and there was a problem which cannot take the large circuit cross section. Moreover, by the method by the electroless deposition shown in drawing 3 , while the palladium used as a catalyst was expensive, there was a problem whose control of bath, such as plating liquid and temperature, is trouble very much. On the other hand, as a method of manufacturing the case combination circuit board, by the method using the imprint sheet 13 shown in drawing 4 , while routings, such as preforming, increased, there was a possibility that

location precision might fall by the elongation of the imprint sheet 13, and since electroplating to the inside of a three-dimensions configuration was difficult, moreover, there was a problem to which productivity falls. Moreover, while a resin feeding means and shaping equipment were needed for the core 21 shown in drawing 5 by the method of forming the circuit object 23 as a method of manufacturing the case combination circuit board and equipment became large-scale, like ****, the large circuit cross section could not be taken but the circuit where a high current flows had the defect which cannot be used. This invention was made in view of the above-mentioned condition, it is cheap, and its working hours are also short, offers the manufacture method of the circuit board which can moreover form a circuit object with the big cross section in a high location precision, and aims at aiming at reduction of cost, compaction of production time, improvement in precision, and increase of permission power.

[0007]

[Means for Solving the Problem] The manufacture method of the circuit board concerning this invention for attaining the above-mentioned purpose forms in the shaping side of a die the circuit object which consists of a metal deposit by electrolytic plating, pushes this die against the substrate which consists of thermoplastic resin, carries out the heating maintenance of the die, carries out heating sticking by pressure of said circuit object to this substrate, and is characterized after substrate cooling by to imprint said circuit object to a substrate side by making said die desert a substrate. Moreover, a manufacture method of the circuit board forms in a shaping side of a convex die a circuit object which consists of a metal deposit by electrolytic plating. Carry a substrate which consists of thermoplastic resin on a concave die, and this substrate is made into a heating condition. This substrate is pushed in into a hole of a concave die with said convex die, heating maintenance of a convex die and the concave die may be carried out, heating sticking by pressure of the circuit object may be carried out to a substrate, and a three-dimensions circuit object may be imprinted to an inside of a resin shaping case by making said convex die desert a concave die after substrate cooling.

[0008]

[Function] The circuit object which becomes a die from a metal deposit is formed, this die is pushed against a substrate, by heating maintenance being carried out, heating sticking by pressure is carried out to a substrate, and the manufacture of the circuit board of a circuit object is attained, without performing electroless deposition. Moreover, the circuit object which consists of a metal deposit is formed in the shaping side of a convex die, a substrate is pushed in into the hole of a concave die with a convex die, by heating maintenance of a convex die and the concave die being carried out, while the circuit object has been in the condition of a three-dimensions configuration, heating sticking by pressure is carried out in the inside of a resin shaping case, and a circuit object is arranged in a high location precision. and the circuit object of a convex die -- thick-film formation -- being formed of easy electrolytic plating -- the conductor of a circuit object -- it becomes easy to take large thickness.

[0009]

[Example] Hereafter, the suitable example of the manufacture method of the circuit board concerning this invention is explained to details with reference to a drawing. Drawing 1 is drawing showing the manufacture procedure by the first example of the circuit board manufacture method concerning this invention, like electrolysis galvanizer, in (B), a heating sticking-by-pressure production process and (C) express a heating maintenance production process, and (D) expresses [(A)] the removal production process of a die. First, the circuit object 35 which performs electrolytic plating and becomes the exposed shaping side from the metal deposit of desired thickness is acquired, masking a die (convex die) 31 with an insulating tape 33 or resin in a reverse plugging-chart configuration, putting this masked die 31 into the coppering liquid containing a brightener etc., and stirring liquid, as shown in (A). at this example, a conductor is deposited by 5 (A/dm2), stirring liquid -- making -- a conductor -- it plates to thickness 100-300 (micrometer). Moreover, in order to raise the detachability of a deposit in this case, a conductive paste may be beforehand applied to a die 31.

[0010] Subsequently, as shown in (B), the die 31 from which masking was removed is pushed against the substrate 37 which consists of thermoplastic ABS plastics, after this, a die 31 is heated and heating

sticking by pressure of the circuit object 35 is performed. In this example, a die 31 is pushed by 10 (kg/cm2) and heated to 120 (degree C).

[0011] As shown in (C), heating sticking by pressure is performed by carrying out heating maintenance of the die 31 until the circuit object 35 fully sticks to a substrate 37. In this example, after holding for about 5 minutes at an above-mentioned heating temperature, it cools to a room temperature.

[0012] Subsequently, after cooling a die 31 until thermoplastic ABS plastics obtain sufficient reinforcement as shown in (D), a die 31 is made to desert a substrate 37, the circuit object 35 is imprinted to a substrate 37 side, and the circuit board 39 is obtained.

[0013] Next, the example which forms a three-dimensions circuit object is explained as an application of the manufacture method of the circuit board concerning this invention. Drawing 2 is drawing showing the formation procedure of the three-dimensions circuit object by the second example of the circuit board manufacture method concerning this invention, like electrolysis galvanizer, in (B), a heating sticking-by-pressure production process and (C) express a heating maintenance production process, and (D) expresses [(A)] the removal production process of a die. First, as shown in (A), like [the convex die 41] an above-mentioned example, it masks with an insulating tape 42 etc., electrolytic plating is performed, and the circuit object 43 which consists of a metal deposit of desired thickness (100-300 micrometers of thickness [This example a conductor]) is acquired.

[0014] Subsequently, as shown in (B), the substrate 45 which consists of thermoplastic ABS plastics is carried on the concave die 47 of a heating condition, and a substrate 45 is pushed in into the hole of the concave die 47 with the convex die 41 in the heating condition that masking was removed. The convex die 41 is pushed by 10 (kg/cm2), the convex die 41 and the concave die 47 are heated to 120 (degree C), and it fabricates in this example by raising the pressure of the convex die 41 to 30 (kg/cm2) further.

[0015] As shown in (C), heating sticking by pressure is performed by carrying out heating maintenance of the convex die 41 and the concave die 47 until the circuit object 43 fully sticks to a substrate 45. In this example, after holding for about 5 minutes at an above-mentioned heating temperature, it cools to a room temperature.

[0016] Subsequently, after cooling the convex die 41 and the concave die 47 until thermoplastic ABS plastics obtain sufficient reinforcement as shown in (D), the convex die 41 is made to desert a substrate 45, and resin shaping case 49 ** which imprinted the three-dimensions circuit object 43 to the inside of a substrate 45 is obtained.

[0017] In addition, as a resin member used as substrates 37 and 45, crystalline thermosetting resin, such as amorphous substances, such as a polycarbonate besides the ABS plastics mentioned above and polyether sulphone, and polyethylene, and polypropylene, can be used. Moreover, copper or silver can be used as a material of the circuit objects 35 and 43.

[0018]

[Effect of the Invention] Since according to the manufacture method of the circuit board concerning this invention the circuit object which becomes a die from a metal deposit is formed, this die is pushed against a substrate, heating maintenance is carried out and it was made to carry out heating sticking by pressure of the circuit object to a substrate, as explained to details above, while an electroless deposition production process can be skipped, not using an expensive catalyst and being able to shorten working hours, the cost of materialses are also reducible. Moreover, if form in the shaping side of a convex die the circuit object which consists of a metal deposit, a substrate is pushed in into the hole of a concave die with a convex die, heating maintenance of a convex die and the concave die is carried out and heating sticking by pressure of the circuit object is carried out to a substrate a three-dimensions circuit object -- a high location precision -- the inside of a resin shaping case -- it can imprint -- moreover -- the circuit object of three dimensions -- also setting -- a conductor -- large thickness can be taken and transfer of not only an electrical signal but high power can be enabled.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the manufacture procedure by the first example of the circuit board manufacture method concerning this invention, and like electrolysis galvanizer, in (B), a heating sticking-by-pressure production process and (C) express a heating maintenance production process, and (D) expresses [(A)] the removal production process of a die.
[Drawing 2] It is drawing showing the formation procedure of the three-dimensions circuit object by the second example of the circuit board manufacture method concerning this invention, and like electrolysis galvanizer, in (B), a heating sticking-by-pressure production process and (C) express a heating maintenance production process, and (D) expresses [(A)] the removal production process of a die.
[Drawing 3] It is drawing explaining the manufacture method of the conventional circuit board by electroless deposition.
[Drawing 4] It is drawing explaining the manufacture method of the conventional circuit board by the imprint sheet.
[Drawing 5] It is drawing explaining the manufacture method of the conventional circuit board using a circuit object formation core.
[Description of Notations]
31 Die
35 43 Circuit object
37 45 Substrate
39 Circuit Board
41 Convex Die
47 Concave Die
49 Resin Shaping Case

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(71)出願人　000006895
矢崎総業株式会社
東京都港区三田１丁目４番28号

(72)発明者　秋葉　義信
静岡県御殿場市川島田252　矢崎部品株式会社内

(72)発明者　勝亦　信
静岡県御殿場市川島田252　矢崎部品株式会社内

(72)発明者　牛島　均
静岡県御殿場市川島田252　矢崎部品株式会社内

(74)代理人　弁理士　荻野　平　（外３名）

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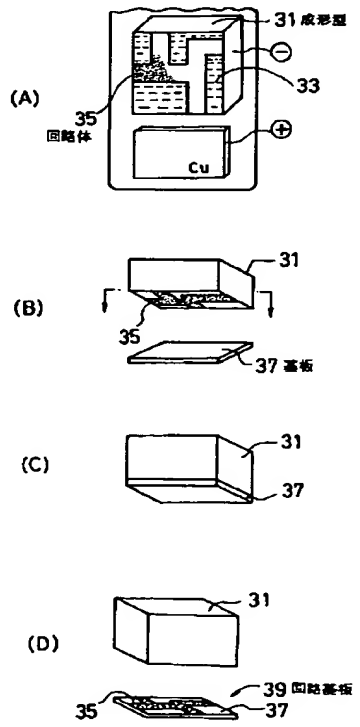
(54)【発明の名称】　回路基板の製造方法

(57)【要約】

【目的】　安価で作業時間も短く、断面積の大きな回路体を高い位置精度で形成できる回路基板の製造方法を得る。

【構成】　成形型３１の成形面に電解メッキにより金属メッキ層からなる回路体３５を形成し、この成形型３１を熱可塑性の樹脂からなる基板３７に押し付ける。成形型３１を加熱保持して回路体３５を基板３７へ加熱圧着し、基板冷却後、成形型３１を基板３７から離反させることで、回路体３５を基板３７側に転写する。



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【特許請求の範囲】

【請求項１】　成形型の成形面に電解メッキにより金属メッキ層からなる回路体を形成し、該成形型を熱可塑性の樹脂からなる基板に押し付け、成形型を加熱保持して前記回路体を該基板へ加熱圧着し、基板冷却後、前記成形型を基板から離反させることで前記回路体を基板側に転写することを特徴とする回路基板の製造方法。

【請求項２】　凸状成形型の成形面に電解メッキにより金属メッキ層からなる回路体を形成し、熱可塑性の樹脂からなる基板を凹状成形型上にのせ、該基板を加熱状態とし、前記凸状成形型で該基板を凹状成形型の穴の中に押し込み、凸状成形型及び凹状成形型を加熱保持して回路体を基板へ加熱圧着し、基板冷却後、前記凸状成形型を凹状成形型から離反させることで樹脂成形ケースの内面へ三次元回路体を転写することを特徴とする回路基板の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、加熱圧着による回路基板の製造方法に関する。

【０００２】

【従来の技術】従来、回路基板の製造方法としては、金属薄膜が被覆された基板の全面に感光性樹脂を塗布し、写真技術によって配線図形状に耐腐食性樹脂膜を被覆し、露出した金属薄膜部分を腐食液によって溶解除去（エッチング）し、所望の回路基板を得るものが一般的に知られている。

【０００３】また、無電解メッキによる方法として、図３に示すように、絶縁基板１の表面に接着剤３を塗布し（Ａ）、塩化パラジウムの活性化処理液に浸漬して微粒子の金属パラジウム核５を基板１の全面に付着させ（Ｂ）、耐腐食性の樹脂からなるレジスト７で配線図形を印刷し（Ｃ）、金属パラジウムを溶解する腐食液で露出した金属パラジウム核５を溶解除去し（Ｄ）、レジスト７を溶解除去した後、配線図形状に残留した金属パラジウム核５の上に無電解メッキにより金属９を析出させ（Ｅ）、所望の回路基板を得るものが特開昭５０－１１３７６６号公報に開示されている。

【０００４】一方、近年では、電気製品の小型化、軽量化を図るため、ケースの内側表面に回路パターンを形成し、ケース自体を回路基板としたものも提案されている。このようなケース兼用回路基板を製造する方法として、図４に示すように、導電性インキを印刷して形成した回路１１を有する転写シート１３を予備成形し、この予備成形体を射出成形の金型１５ａ、１５ｂ内に配置し（Ａ）、合成樹脂の射出成形を行って、成形品１７を得ると同時に表面に三次元の回路体１１を形成し、この回路体１１上に金属メッキ１９を施すことにより（Ｂ）、所望の回路基板を得るものが特開昭６３－１１７４９３号公報に開示されている。

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【０００５】また、ケース兼用回路基板を製造する他の方法として、図５に示すように、コア２１の表面に回路体２３を形成し（Ａ）、このコア２１を成形型２５にセットし（Ｂ）、成形用の樹脂をスプル２７から圧送し、キャビティ２９内に充填し、充填された成形樹脂が冷却硬化された後、成形型２５を開いて成形品を取り出すことによって、所望の回路基板を得るものが特開平２－２８９９２号公報に開示されている。

【０００６】

【発明が解決しようとする課題】しかしながら、上述した従来のエッチングによる方法では、不要部分の金属膜を腐食液によって溶解除去するため、材料の損失が大きく、不経済となる欠点があるとともに、製造時間が長く、回路断面積が大きくとれない問題があった。また、図３に示した無電解メッキによる方法では、触媒として使用されるパラジウムが高価であるとともに、メッキ液、温度などの浴管理が大変めんどうである問題があった。一方、ケース兼用回路基板を製造する方法として、図４に示した転写シート１３を用いる方法では、予備成形などの作業工程が増えるとともに、転写シート１３の伸びにより位置精度が低下する虞れがあり、しかも、三次元形状の内面への電気メッキが困難なため、生産性が低下する問題があった。また、ケース兼用回路基板を製造する方法として、図５に示したコア２１に回路体２３を形成する方法では、樹脂圧送手段、成形装置が必要となり、設備が大掛かりとなるとともに、上述同様、回路断面積が大きくとれず、大電流が流れる回路には使用できない欠点があった。本発明は上記状況に鑑みてなされたもので、安価で作業時間も短く、しかも、断面積の大きな回路体を高い位置精度で形成することができる回路基板の製造方法を提供し、コストの低減、製造時間の短縮、精度の向上及び許容電力の増大を図ることを目的とする。

【０００７】

【課題を解決するための手段】上記目的を達成するための本発明に係る回路基板の製造方法は、成形型の成形面に電解メッキにより金属メッキ層からなる回路体を形成し、該成形型を熱可塑性の樹脂からなる基板に押し付け、成形型を加熱保持して前記回路体を該基板へ加熱圧着し、基板冷却後、前記成形型を基板から離反させることで前記回路体を基板側に転写することを特徴とするものである。また、回路基板の製造方法は、凸状成形型の成形面に電解メッキにより金属メッキ層からなる回路体を形成し、熱可塑性の樹脂からなる基板を凹状成形型上にのせ、該基板を加熱状態とし、前記凸状成形型で該基板を凹状成形型の穴の中に押し込み、凸状成形型及び凹状成形型を加熱保持して回路体を基板へ加熱圧着し、基板冷却後、前記凸状成形型を凹状成形型から離反させることで樹脂成形ケースの内面へ三次元回路体を転写するものであってもよい。

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【０００８】

【作用】成形型に金属メッキ層からなる回路体が形成され、この成形型が基板に押し付けられ、加熱保持されることで、回路体が基板へ加熱圧着され、無電解メッキを行わずに回路基板の製造が可能となる。また、凸状成形型の成形面に金属メッキ層からなる回路体が形成され、凸状成形型で基板が凹状成形型の穴の中に押し込まれ、凸状成形型及び凹状成形型が加熱保持されることで、回路体が三次元形状の状態のままで、樹脂成形ケースの内面へ加熱圧着され、回路体が高い位置精度で配設される。そして、凸状成形型の回路体が厚膜形成容易な電解メッキにより形成されることで、回路体の導体厚を大きくとることが容易となる。

【０００９】

【実施例】以下、本発明に係る回路基板の製造方法の好適な実施例を図面を参照して詳細に説明する。図１は本発明に係る回路基板製造方法の第一実施例による製造手順を示す図で、（Ａ）は電解メッキ工程、（Ｂ）は加熱圧着工程、（Ｃ）は加熱保持工程、（Ｄ）は成形型の除去工程を表す。先ず、（Ａ）に示すように、成形型（凸状成形型）３１に、逆配線図形状で絶縁テープ３３又は樹脂などによりマスキングし、このマスキングされた成形型３１を光沢剤などの入った銅メッキ液に入れ、液を撹拌しながら電解メッキを行い、露出した成形面に所望の厚さの金属メッキ層からなる回路体３５を得る。本実施例では、液を撹拌しながら５（Ａ／ｄｍ^2）で導体を析出させ、導体厚１００～３００（μｍ）までメッキする。また、この際、メッキ層の剥離性を向上させるため、成形型３１に予め導電性ペーストを塗布してもよい。

【００１０】次いで、（Ｂ）に示すように、マスキングが除去された成形型３１を熱可塑性のＡＢＳ樹脂からなる基板３７に押し付け、この後、成形型３１を加熱して回路体３５の加熱圧着を行う。本実施例では、成形型３１を１０（ｋｇ／ｃｍ^2）で押し付け、１２０（℃）まで加熱する。

【００１１】（Ｃ）に示すように、加熱圧着は、回路体３５が充分に基板３７へ密着するまで成形型３１を加熱保持することにより行う。本実施例では、上述の加熱温度で約５分間保持した後、室温まで冷却する。

【００１２】次いで、（Ｄ）に示すように、熱可塑性のＡＢＳ樹脂が充分な強度を得るまで成形型３１を冷却した後、成形型３１を基板３７から離反させ、回路体３５を基板３７側に転写して回路基板３９を得る。

【００１３】次に、本発明に係る回路基板の製造方法の応用例として、三次元回路体を形成する実施例を説明する。図２は本発明に係る回路基板製造方法の第二実施例による三次元回路体の形成手順を示す図で、（Ａ）は電解メッキ工程、（Ｂ）は加熱圧着工程、（Ｃ）は加熱保持工程、（Ｄ）は成形型の除去工程を表す。先ず、

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（Ａ）に示すように、凸状成形型４１に上述の実施例と同様に、絶縁テープ４２などでマスキングし、電解メッキを行い、所望の厚さ（本実施例では、導体厚１００～３００μｍ）の金属メッキ層からなる回路体４３を得る。

【００１４】次いで、（Ｂ）に示すように、熱可塑性のＡＢＳ樹脂からなる基板４５を加熱状態の凹状成形型４７の上にのせ、マスキングが除去された加熱状態の凸状成形型４１で基板４５を凹状成形型４７の穴の中に押し込む。本実施例では、凸状成形型４１を１０（ｋｇ／ｃｍ^2）で押し付け、凸状成形型４１、凹状成形型４７を１２０（℃）まで加熱し、更に凸状成形型４１の圧力を３０（ｋｇ／ｃｍ^2）に上げて成形を行う。

【００１５】（Ｃ）に示すように、加熱圧着は、回路体４３が充分に基板４５へ密着するまで凸状成形型４１、凹状成形型４７を加熱保持することにより行う。本実施例では、上述の加熱温度で約５分間保持した後、室温まで冷却する。

【００１６】次いで、（Ｄ）に示すように、熱可塑性のＡＢＳ樹脂が充分な強度を得るまで凸状成形型４１、凹状成形型４７を冷却した後、凸状成形型４１を基板４５から離反させ、三次元回路体４３を基板４５の内面へ転写した樹脂成形ケース４９ををを得る。

【００１７】なお、基板３７、４５となる樹脂部材としては、上述したＡＢＳ樹脂の他、ポリカーボネイト、ポリエーテルサルホンなどの非晶質、及びポリエチレン、ポリプロピレンなどの結晶性の熱硬化性樹脂が使用できる。また、回路体３５、４３の素材としては、銅又は銀などが使用できる。

【００１８】

【発明の効果】以上詳細に説明したように、本発明に係る回路基板の製造方法によれば、成形型に金属メッキ層からなる回路体を形成し、この成形型を基板に押し付けて加熱保持し、回路体を基板へ加熱圧着するようにしたので、無電解メッキ工程が省かれ、高価な触媒を使用せずに済み、作業時間を短縮することができるとともに、材料費も削減することができる。また、凸状成形型の成形面に金属メッキ層からなる回路体を形成し、凸状成形型で基板を凹状成形型の穴の中に押し込み、凸状成形型及び凹状成形型を加熱保持して回路体を基板へ加熱圧着すれば、三次元回路体を高い位置精度で樹脂成形ケースの内面へ転写することができ、しかも、三次元の回路体においても導体厚を大きくとることができ、電気信号のみならず高電力の伝達を可能にすることができる。

【図面の簡単な説明】

【図１】本発明に係る回路基板製造方法の第一実施例による製造手順を示す図で、（Ａ）は電解メッキ工程、（Ｂ）は加熱圧着工程、（Ｃ）は加熱保持工程、（Ｄ）は成形型の除去工程を表す。

【図２】本発明に係る回路基板製造方法の第二実施例に

よる三次元回路体の形成手順を示す図で、（A）は電解メッキ工程、（B）は加熱圧着工程、（C）は加熱保持工程、（D）は成形型の除去工程を表す。

【図３】無電解メッキによる従来の回路基板の製造方法を説明する図である。

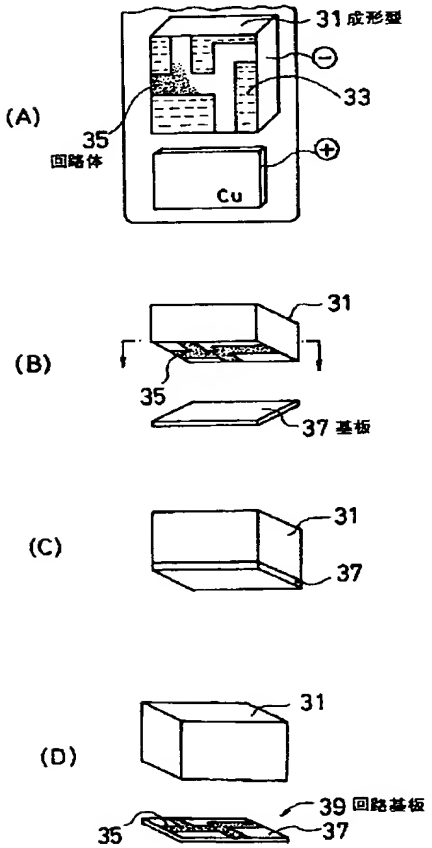
【図４】転写シートによる従来の回路基板の製造方法を説明する図である。

【図５】回路体形成コアを用いる従来の回路基板の製造方法を説明する図である。

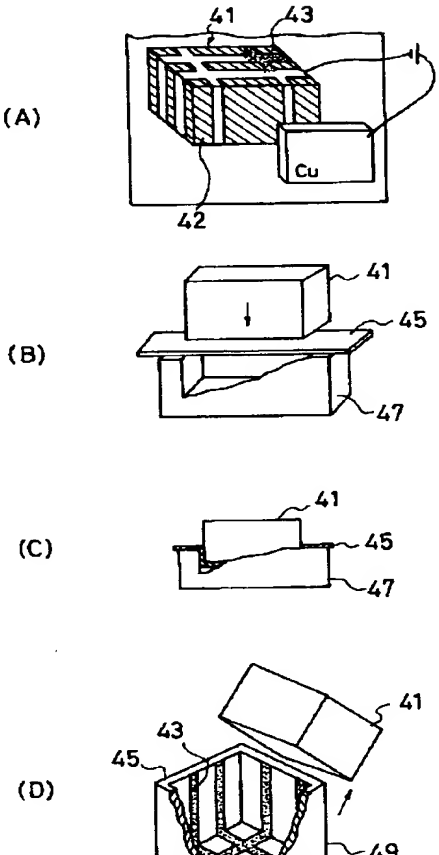
【符号の説明】

３１　成形型
３５、４３　回路体
３７、４５　基板
３９　回路基板
４１　凸状成形型
４７　凹状成形型
４９　樹脂成形ケース

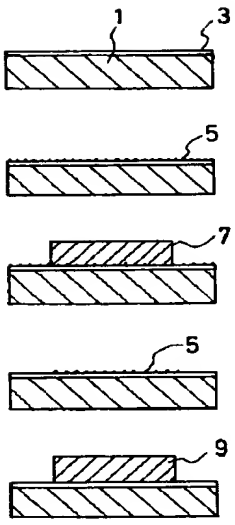
【図１】



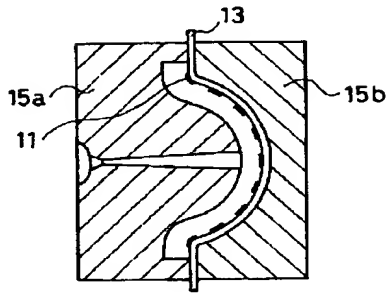
【図２】

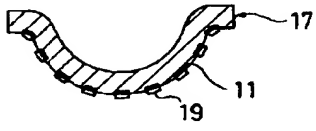


【図３】

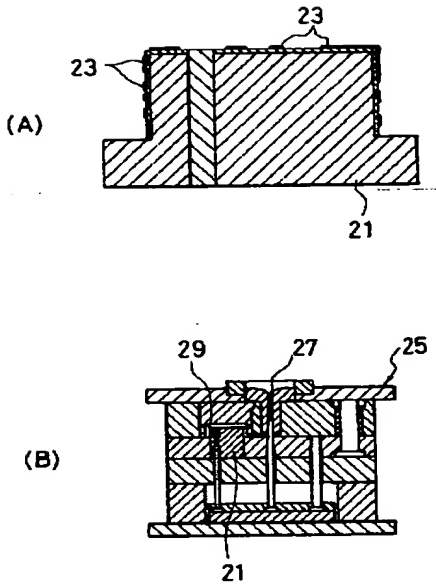


【図４】





【図５】



フロントページの続き

(72)発明者　山梨　秀則
静岡県御殿場市川島田252　矢崎部品株式
会社内